

## Human Body Systems and Disease

- 7-3 The student will demonstrate an understanding of the functions and interconnections of the major human body systems, including the breakdown in structure or function that disease causes. (Life Science).**

- 7.3.4 Explain the effects of disease on the major organs and body systems (including infectious diseases such as colds and flu, AIDS, and athlete's foot and noninfectious diseases such as diabetes, Parkinson's, and skin cancer).**

**Taxonomy level:** 2.7-B Understand Conceptual Knowledge

**Previous/Future knowledge:** This is the first time in science that students have been introduced to the concept of disease relating to the human body. In 6<sup>th</sup> grade (6-2.9), students studied the effect of disease-causing fungi on plants. Students will study the detection and treatment of some common communicable and chronic diseases and how disease processes affect the body systems in health, but students will *not* develop this concept further in high school Biology as the focus of that course of study will be at the cellular level.

**It is essential for students to** know that a *disease* is a condition that does not allow the body to function normally. Diseases can affect either an individual organ or an entire body system. Diseases are divided into two groups—infectious and noninfectious.

*Infectious diseases* are caused by tiny organisms called *pathogens*.

- These pathogens can be bacteria, viruses, fungi, or protists.
- These pathogens can come from another person, a contaminated object, an animal bite, or the environment.
- The *immune system* is responsible for distinguishing between the different kinds of pathogens and reacting to each according to its type.
- Once a pathogen has entered the body, it works by damaging individual cells within the organs or in some cases attacks an entire body system.

Examples of infectious diseases include:

### *Colds*

- An illness caused by a viral infection located in the respiratory system.
- Once inside the human body, the cold virus multiplies and attacks the mucous membranes of the nose and throat causing the common effects of the cold (for example, sore throat, runny nose or fever).
- Because the cold is caused by a virus it cannot be treated with an antibiotic.

### *Flu*

- *Influenza*, commonly known as "the flu," is a highly contagious viral infection of the respiratory system.
- Influenza typically causes fever, muscle aches, and a more severe cough than the common cold and usually lasts longer.

### *Athlete's foot*

- A common fungal infection of the skin of the feet.
- The fungus may be contracted from public environments and then grows in the warm and moist environment usually between the toes, and can be difficult to cure.

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### *AIDS*

- Acquired immunodeficiency syndrome (AIDS) is caused by the human immunodeficiency virus (HIV).
- This virus attacks the cells in the immune system making the organism unable to fight off other pathogens that may attack the body.

NOTE TO TEACHER: Caution should be taken when discussing AIDS with students. Follow guidelines as prescribed by the Health curriculum.

### *Strep throat*

- Strep throat is a contagious disease caused by bacterial infection.
- Strep throat symptoms include fever, pain, redness, and swelling of the throat and tonsils.
- Strep throat may produce mild or severe symptoms.

NOTE TO TEACHER: Other examples of infectious diseases that are included in the Health curriculum are tetanus (caused by bacteria), pneumonia (caused by a virus or bacteria), or malaria (caused by a protist spread by mosquitoes).

*Noninfectious diseases* are diseases that are not caused by pathogens in the body.

- They are not spread from organism to organism.
- These diseases are caused by malfunctions in body systems that are either inherited or caused by environmental factors.

Examples of noninfectious diseases include:

### *Diabetes*

- A disease that results in the glucose (sugar) level of the blood being higher than the normal range.
- It is caused by a person's inability to either produce or use properly a natural chemical produced in the body called *insulin*.
- The higher level of blood sugar results in many disorders of the body, for example an increase in problems with circulation of blood.
- Diabetes can lead to kidney disease or heart disease or cause vision problems.

### *Parkinson's disease*

- A disease of the nervous system that occurs when certain nerve cells in the brain stop functioning properly, affecting the muscular system.
- The major symptoms are severe shaking (tremors) and disabilities involving movement.
- At present, there is no cure for Parkinson's disease.

### *Skin Cancer*

- A disease in which skin cells found in the outer layers of the skin becomes damaged.
- Factors that can lead to skin cancer are damaging ultraviolet rays (UV) from the Sun or tanning beds and heredity.

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### *Asthma*

- Asthma is a disease that affects the lungs and the airways that deliver air to the lungs.
- It causes periodic attacks of wheezing and difficult breathing.
- An asthma attack occurs when the airways become inflamed in response to a stimulus, such as dust, mold, pets, exercise, or cold weather.
- However, some attacks start for no apparent reason.

NOTE TO TEACHER: Other examples of noninfectious diseases that are included in the Health curriculum are allergies, arthritis, heart disease, or multiple sclerosis.

**It is not essential for students to** know how the immune system specifically responds to different pathogens (for example T-cells and B cells) or to go into depth regarding other diseases of the human body.

### **Assessment Guidelines:**

The primary focus of this indicator is to *explain* the effects of disease on the major organs and body systems; therefore, the primary focus of assessment should be to construct a cause-and-effect model of how infectious and noninfectious diseases affect the organs and systems of the body. However, appropriate assessments should also require students to *classify* the identified diseases as infectious or noninfectious; *identify* which organ or system the disease affects; *identify* the common causes of infectious diseases; or *summarize* the characteristics of a particular disease.